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Field investigations of the July 2015 pyroclastic density current deposits of Volcán de Colima, Mexico

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Small-volume pyroclastic density currents (PDCs) occur frequently and pose severe threats to surrounding populations and infrastructure at dome-producing volcanoes. They are characterized by short duration and complex multiphase flow dynamics due to time and space variability in their properties including particle concentration, granulometry, componentry, bulk rheology and velocity, amongst others. Field investigations of the deposits emplaced by small-volume, concentrated PDCs aim to improve our understanding of the transport and depositional processes of these flows. Spatial and temporal variations in flow dynamics within a PDC moving downslope will reflect on the distribution, grainsize and component characteristics of its deposits. Our study focuses on the recent events of July 10th and 11th, 2015 at Volcán de Colima (Mexico) where rapid magma ascent initiated the partial collapse of a freshly emplaced lava dome complex and a portion of the southern crater rim. These events precipitated the emplacement of successive pulses of small-volume, concentrated PDCs on the southern flank along the Montegrande and San Antonio ravines. A 3-dimensional field analysis of the PDCs' deposit architecture, total grain size distribution and component properties, together with a geomorphic analysis of the affected ravines, provide new insights on the lateral and vertical variations of flow dynamics for this type of flow. Preliminary results reveal three principal stratigraphic units within the valley-confined and concentrated overbank facies, with increasing content in fines with distance from the summit, suggesting an increase in fragmentation processes within the PDCs. The middle unit is characterized by a finer grainsize, a higher accidental lithic content and a lower free crystal content. Moreover, direct correlations are found between rapid changes in channel morphology and generation of overbank (unconfined) flows that escaped valley confines, which could improve the definition of hazard zonations of key areas at risk from future eruptions at Volcán de Colima.